45. The multiple access system of claim 44, wherein time-varied signals comprising one of:

time-hopping signals;

frequency hopping signals;

time-division multiple access signals;

time-division code-division multiple access signals; and

orthogonal frequency division multiple access signals.

Remarks

First, the applicant wishes to express his gratitude for indication of allowability of Claims 1-35 of the instant application.

Claims 19 and 45 are amended to correct an inadvertent typographical error. Attached to this amendment is a copy of the claims showing the changes made.

Claims 36 and 37 stand rejected under 35 USC 102(b) as being anticipated by US Patent No. 5,687,169 issued to Fullerton (the Fullerton patent). Citing Figures 10 and 11 and Column 10, lines 4-37, the Action states that the Fullerton patent discloses delaying pulse transmissions by 10 ns or 100 ns, when an interference scenario occur in contention zones between two pulse trains transmitted by transmitters 1 and 2. With respect to Claim 37, the action states a pulse characteristic inherently has amplitude, a pulse width and a pulse polarity. For reasons given below, this rejection is respectfully traversed.

It is well settled that a claim is anticipated only if each and every claim limitation is found, either expressly or inherently, in a single prior art reference. It is respectfully submitted that Claims 36 and 37 are not anticipated, because the Fullerton patent fails to discloses at least one expressly required claim limitation, namely *an Ultra Wideband Transmitter that inserts at least one time delay specified by at least one code element of at least one delay code between two pulse trains of a plurality of pulse trains.*

Prior to addressing the merits of the rejection, it may be helpful to briefly describe the present invention and its advantages. The present invention adjusts the time offset

between asynchronously generated pulse trains using a novel delay code concept to avoid persistent pulse coincidences that may occur at a receiver. In one embodiment of the invention, at least one time delay is inserted between two pulse trains, for example, after or before a time-hopping code period. In an exemplary embodiment, the time delay is specified by a code element of a delay code that is generated using a known numerical code generation technique, for example, a pseudorandom code generation technique.

More specifically, Claim 36 relates to an impulse transmission system for communicating pulses having at least one predefined pulse characteristics, comprising:

an Ultra Wideband Transmitter; and

an Ultra Wideband Receiver;

wherein said Ultra Wideband Transmitter inserts at least one time delay specified by at least one code element of at least one delay code between two pulse trains of a plurality of pulse trains.

It is respectfully submitted that the Fullerton patent not only fails to disclose *a delay specified by at least one element of a delay code*, but it also fails to disclose inserting such delay *between* two pulse trains of a plurality of pulse trains. As clearly described in the specification, the code-specified delays are inserted between the pulse trains in order to remove persistence coincidences of arriving pulses at a receiver. It is respectfully submitted that the Fullerton patent does not address such pulse coincidence problem, which is associated with arriving pulses at the receiver.

The Fullerton patent relates to full duplex UWB communication between at least two transceivers, with each transceiver having a corresponding transmitter and receiver. Figures 11 and 12 relate to a problem that occurs when the transceivers are transmitting and receiving pulses from each other at the same time. In Column 10, lines 4-8, the Fullerton patent refers to a complication that occurs when it is "necessary for one or the other [transmitter/receiver pair of the transceiver] to transmit and receive exactly simultaneously." The Fullerton patent further states, in Column 10, lines 8-10, that "simultaneous transmission and reception requires too large of a dynamic range in the receiver to allow functionality." To resolve this problem, the Fullerton patent requires the transmitter to delay transmitting pulses by 10ns or 100ns after the receiver of the

corresponding transceiver receives a pulse, thereby avoiding "self interference" as discussed in Column10, line 37.

It is respectfully submitted that there is a fundamental difference between the teaching of the Fullerton patent and the invention covered by Claim 36. For one thing, the 10ns or 100ns delays specified by the Fullerton patent are inserted after a pulse is received at the receiver. To the contrary, the present invention requires inserting the delay between the pulse trains, regardless of when or whether a pulse is received. Moreover, according to the present invention, the inserted delay is specified by at least one code element of at least one delay code, which is selected to avoid persistent pulse coincidence of arriving pulses at the receiver. No such arrangement is disclosed in the Fullerton patent. Finally, the Fullerton patent, upon receiving a pulse gives the transmitter a choice of two delays, i.e., 10 ns or 100 ns, to insert after receiving a pulse. On the other hand, the present invention inserts the delays in accordance with the specified delay code, which is predefined and thus does not involve a choice amongst delays by the transmitter. According to one embodiment of the present invention, the delays codes are inserted based on a received signal quality measure. However, the delay insertion is in no way relative to reception of a pulse at a receiver, as taught by the Fullerton patent.

Claims 38, 44, 45, and 46 stand rejected under 35 USC 103(a) as being un-patentable over the Fullerton patent as applied to Claims 36 and 37 and further in view of US Patent 5,610,907 issued to Barrett (the Barrett patent).

However, the Barrett patent also fails to teach or suggest *a delay specified by at least one element of a delay code* as well as inserting the delay *between* two pulse trains of a plurality of pulse trains. The Barrett patent teaches the use of orthogonal codes such as quadratic congruence (QC) codes, hyperbolic codes (HC) codes, and optical codes. These codes are applied to a superframe that repeats. See Table 1 (column 6). "Superframe, a, e.g., ~1 millisecond, interval, representing one repetition of a code pattern." As such, the Barrett patent does not teach inserting any delays between the superframes as required by the claimed invention, where a superframe corresponds to a pulse train.

In order to establish *prima facie* obviousness under 35 USC 103(a), all of the claim limitations must be taught or suggested by the prior art. It is respectfully submitted that by combining the Fullerton and Barrett patents, the Action has not established *prime facie* obviousness because as explained above, neither reference teach or suggest *inserting at least one time delay specified by at least one code element of at least one delay code between two pulse trains of a plurality of pulse trains*, as required by rejected Claims 38, 44, 45, and 46, which variably incorporate the limitations of Claim 36. For the reasons given above, it is believed that the present application is now in condition for allowance and an early notice of allowance is hereby solicited.

Respectfully submitted,

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Version with markings to show changes made

In the Claim:

19. The method of claim 18, wherein time-varied signals comprising one [consists] of:

time-hopping signals;

frequency hopping signals;

time-division multiple access signals;

time-division code-division multiple access signals; and

orthogonal frequency division multiple access signals.

45. The multiple access system of claim 44, wherein time-varied signals comprising one [consists] of:

time-hopping signals;

frequency hopping signals;

time-division multiple access signals;

time-division code-division multiple access signals; and

orthogonal frequency division multiple access signals.